

REMARKS

Claims 1-17 and 24 are in this application and are presented for consideration. By this amendment, Applicant has amended claims 1-5, 8-12 and 14-17. Claims 18-23 have been canceled subject to Applicant's right to file a divisional application to cover the features recited in these canceled claims. Applicant has also added new claim 24.

Claims 1-7 and 10 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Applicant has amended the claims paying close attention to the Examiner's remarks. Applicant wishes to thank the Examiner for the careful review of the claims. It is Applicant's position that the claims as now presented are clear and fully comply with the requirements of the statute.

Claims 1 and 5-7 have been rejected under 35 U.S.C. 102(b) as being anticipated by Oriti et al. (U.S. 2002/007844).

The present invention relates to a cleaning apparatus for cleaning a member that is used in the semiconductor field. The apparatus includes an endless conveyor which extends through a housing. An air curtain is produced at one end of the housing. A first, second and third water curtain is produced in the housing. One end of the endless conveyor and one end of the housing define a loading section for receiving the member. The air curtain and the first water curtain define a pre-cleaning section of the housing. The first water curtain and the second water curtain define a cleaning section of the housing. The second water curtain and the third water

curtain define a rinsing section of the housing. The third water curtain and the other end of the housing define a drying section of the housing. The other end of the housing and another end of the endless conveyor define an unloading section for receiving the member after the member has been cleaned. This advantageously provides a cleaning apparatus that ensures small water droplets that adhere to the member are removed. The prior art as a whole fails to disclose such features and such cleaning advantages.

Orii et al. discloses a cleaning processing system 1 comprising an in-out port 2 for transferring a wafer W into and out of a carrier C capable of housing the wafer W, a cleaning processing unit 3 for applying a cleaning processing to the wafer W, a stage section 4 arranged between the in-out port 2 and a cleaning processing unit 3 for transferring the carrier C into and out of the cleaning processing unit 3, a carrier cleaning unit 5 for cleaning the carrier C and a carrier stock unit 6 for stocking a plurality of carriers C. The in-out port 2 includes a table 10, a transfer path 11 formed in the arranging direction of the carriers C and a carrier transfer mechanism 12 for transferring the carrier C on the table 10 to the stage section 4 and for transferring the carrier C on the stage section 4 onto the table 10. The carrier transfer mechanism 12 is movable along the transfer path in the arranging direction of the carriers C. The stage section 4 includes a stage 13 on which the carrier C is disposed, and a slide stage 32 is arranged in the stage 13. The arm of the carrier transfer mechanism 12 is swung for transferring the carrier C from the table 10 onto the stage 13, with the result that the carrier C is disposed on the stage 13 in a direction opposite to that on the table 10. A partition wall 14 is formed between the stage section 4 and the cleaning processing unit 3. Inside the cleaning

processing unit 3 is a cleaning processing section 20, a carrier waiting section 30 positioned under the cleaning processing section 20 for temporarily storing the carrier C and a wafer transfer mechanism 40 for transferring the wafer W between the carrier C transferred into the carrier cleaning section 30 and the rotor 24 arranged in the cleaning processing section 20.

Orii et al. fails to teach and fails to suggest the combination of an air curtain and a first water curtaining that define a pre-cleaning section of a housing. Orii et al. merely discloses a processing unit 3 that has a cleaning processing section 20 and a carrier waiting section 30. However, the processing unit 3 does not have an air curtain or a plurality of water curtains as claimed. The air curtain and water curtains are of significant importance in the present invention because they advantageously remove small droplets of water and other contaminants from the member as the member is moved along the conveyor belt. Orii et al. fails to disclose such contamination removing advantages since the processing unit 3 of Orii et al. does not have a pre-cleaning section defined by an air curtain and a water curtain or a cleaning section defined by two water curtains as featured in the claimed combination. Accordingly, Applicant respectfully requests that the Examiner favorably consider claim 1 as now presented and all claims that depend thereon.

Claims 1, 3, 5 and 7 have been rejected under 35 U.S.C. 102(a) as being anticipated by JP 2003-017459 ("JP '459" hereinafter).

JP '459 discloses a method for cleaning a carrier. The method comprises the steps of finely granulating a cleaning liquid to a particle size of 50 micrometers or less by a cleaning liquid injection of the fine particles to at least the overall surface of a wafer carrier 10, which

semiconductor wafers are aligned in parallel and contained. The nozzle 21 is set to face toward a cleaning site and is moved, while a distance up to the site is maintained to be substantially constant. The carrier 10 is supported with an opening directed downward so that the cleaning liquid injected to the inner surface of the carrier is discharged sequentially.

JP '459 fails to teach or suggest the combination of an air curtain and a plurality of water curtains that define a pre-cleaning section, a cleaning section and a drying section of a housing. At most, JP '459 discloses a nozzle 21 that is directed toward a cleaning site. However, JP '459 is completely void of any teaching or suggestion of a water curtain or an air curtain as claimed. Compared with JP '459, an air curtain and a first water curtain define a pre-cleaning section of a housing. A plurality of nozzles are located within the pre-cleaning section for applying purified water to the member. This advantageously removes particles and other contaminants from the member as the member is moved along a conveyor belt. In contrast to the present invention, JP '459 only discloses a single nozzle facing a direction of a cleaning site, but fails to disclose an air curtain or a plurality of nozzles as recited in the claimed combination. Accordingly, Applicant respectfully requests that the Examiner favorably consider claim 1 as now presented and all claims that depend thereon.

Claims 1-4, 7-11 and 13-15 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Varpio (U.S. 2002/0020435) in view of JP '459.

Varpio discloses an automated washing apparatus comprising a washing conveyor 1 that conveys racks 21a, 21b to be washed. Dishes are arranged in the racks. The washing apparatus comprises a prewash zone 2 followed by a main wash zone 3 and a rinsing zone 4.

The washing apparatus is preceded by a feeder conveyor 5 bringing in the racks 21a, 21b and followed by a discharge conveyor 6 at the outlet end. Containers 7 and 8 store the washing fluid for the prewash and the main wash.

Varpio fails to provide any teaching or suggestion for an air curtain and a first water curtain that define a pre-cleaning section of a housing. Varpio merely discloses a conveyor 1 that conveys dish racks through a main wash zone 3 and a rinsing zone 4. However, the main wash zone 3 and the rinsing zone 4 of Varpio are not defined by a plurality of water curtains as claimed. Compared with Varpio, the water curtains of the present invention define a cleaning section of a housing and an air curtain and a first water curtain define a pre-cleaning section of the housing. This advantageously removes small water droplets from the wafer along with other contaminants that may be on the member. This advantageously ensures that the member is as clean as possible. Varpio is concerned with a completely different problem than the present invention. Varpio is only concerned with cleaning dishes and is not concerned with cleaning wafers such that the wafers can be used in clean room environments. As such, the prior art as a whole fails to disclose important features of the present invention and directs the person of ordinary skill away from the features recited in the claimed combination.

As previously discussed above, JP '459 also fails to teach or suggest the combination of an air curtain and a plurality of water curtains that define various sections of a housing. As such, the prior art as a whole fails to direct the person of ordinary skill in the art toward each feature recited in the claimed combination. Accordingly, Applicant respectfully requests that the Examiner favorably consider claims 1 and 8 as now presented and all claims that

respectively depend thereon.

Claims 1, 2, 7-11, 13, 14 and 15 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Varpio in view of Orii et al.

As previously discussed above, Varpio and Orii et al. fail to teach or suggest the combination of an air curtain and a first water curtain that define a precleaning section of a housing. Varpio merely discloses a conveyor that transports dish racks through a washing section and a rinsing section, but there is neither an air curtain nor a plurality of water curtains that divide a housing into various cleaning sections as claimed. As such, the prior art as a whole takes a different approach and fails to direct the person of ordinary skill in the art toward each feature of the claimed combination as claimed. Accordingly, Applicant respectfully requests that the Examiner favorably consider claims 1 and 8 as now presented and all claims that respectively depend thereon.

Claim 12 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Varpio in view of Orii et al., and further in view of Kamikawa (U.S. 5,214,118).

Although Kamikawa discloses a loader, an unloader and three washing units arranged between the loader and the unloader, the references as a whole fail to suggest the combination of features claimed. Specifically, the references as a whole fail to provide any suggestion for the combination for the specific arrangement of the air curtain and the plurality of water curtains as claimed. As such, the references do not suggest the invention and therefore all claims define over the prior art as a whole.

Claim 16 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Varpio

in view of Orii et al., and further in view of Murray et al. (U.S. 6,016,819). Although Murray et al. discloses a pickling area enclosed at each end with a water curtain, the references as a whole fail to suggest the combination of features claimed. Specifically, the references as a whole fail to provide any suggestion for the combination for the specific arrangement of the a first water curtain and a second water curtain that define a pre-cleaning section of a housing. As such, the references do not suggest the invention and therefore all claims define over the prior art as a whole.

Claims 1-11 and 13-14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2001-156034 ("JP '034" hereinafter) in view of JP '459.

JP '034 discloses a method that contains a first process where a wafer carrier is rinsed with pure warm water. A second process cleans the wafer carrier with solution containing surface active agent to remove dust sticking to the surface or inorganic or organic contamination. The wafer carrier is subjected to a third process where the wafer carrier is impregnated with active pure water to remove a high concentration impregnation layer. The method includes a fourth process where the wafer carrier is treated with heated pure water. The wafer carrier is subjected to a fifth process where a water droplet sticking to the wafer carrier is blown off by a blow process with dry gas containing at least one of clean dry air and clean inert gas as a main gas, or shaken off by a spin process for performing a draining process. A sixth process dries the wafer carrier in a prescribed atmosphere under a constant temperature, while purging with warm dry air for conducting the final dry processing.

JP '034 fails to teach and fails to suggest the combination of an air curtain and a first

water curtain that define a pre-cleaning section of a housing. At most, JP '034 discloses a method for treating a wafer carrier with heated pure water and subjecting the wafer carrier to blown air. However, JP '034 does not disclose that the wafer carrier is passed through an air curtain or a plurality of water curtains as claimed. Compared to JP '034, the present invention includes an air curtain and a first water curtain that define a pre-cleaning section of a housing. According to the present invention, the first water curtain and a second water curtain define a cleaning section of the housing. This advantageously ensures that the member is cleaned and that small water droplets that remain on the member after the wafer member is cleaned are completely removed. JP '034 fails to disclose such effective cleaning advantages since JP '034 does not disclose a plurality of water curtains or an air curtain as claimed. As such, the prior art as a whole fail to disclose each feature of the claimed combination.

As previously discussed above, JP '459 also fails to teach or suggest the combination of an air curtain and a plurality of water curtains that define various sections of a housing. As such, the prior art as a whole fails to direct the person of ordinary skill in the art toward each feature recited in the claimed combination. Accordingly, Applicant respectfully requests that the Examiner favorably consider claims 1 and 8 as now presented and all claims that respectively depend thereon.

Claim 12 has been rejected under 35 U.S.C. 103(a) as being unpatentable over JP '034 in view of JP '459, and further in view of Kamikawa. Claim 15 has been rejected under 35 U.S.C. 103(a) as being unpatentable over JP '034 in view of JP '459 and further in view of Varpio. Claim 16 has been rejected under 35 U.S.C. 103(a) as being unpatentable over JP '034

in view of JP '459, and further in view of Murray et al.

All of these rejections are based on the interpretation of JP '034 and JP '459 as teaching the combination of an air curtain and a plurality of water curtains. A fair reading of the JP '034 and JP '459 references indicates that the references as a whole do not provide any teaching or suggestion for the arrangement of the water curtains that define sections of a housing as claimed. The references as a whole clearly do not direct a person of ordinary skill in the art towards the invention as claimed. Accordingly, reconsideration of these rejections is requested.

Applicant has added new independent claim 24. New independent claim 24 includes features similar to those found in claims 1 and 8, but further highlights the system for delivering purified water. Applicant respectfully requests that the Examiner favorably consider new independent claim 24 as presented.

Further and favorable consideration on the merits is requested.

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